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22 OCTOBER 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

CONTENTS

SPAIN

SWEDEN

/9986

EXECUTIVE YUAN DISCUSSES DISPOSAL OF NUCLEAR WASTE

OW261127 Taipei CNA in English 0235 GMT 26 Sep 86

[Text] Taipei, 25 Sep (CNA)--The Executive Yuan said Thursday that it has begun to improve and expand the storage facilities at the first and second nuclear power plants in order to store the used nuclear fuel up to the year 2000.

It also indicated that the Atomic Energy Council is cooperating with the Taiwan Power Company in working out medium and long-term plans for the storage of nuclear waste after 2000.

In a written response to an interpellation by Legislator Chang Chun-hsiung, the Yuan said that AEC has engaged consultant firms in the U.S. and France to make an overall evaluation of related laws in advanced nations and the geographical features and environment of this nation. AEC will then work out its policy on the storage of nuclear waste based on their research results, it said.

The Yuan also denied rumors that it was planning to build the orchid island where nuclear waste is being stored into a "nuclear power park."

It said, however, that after the nuclear waste storage facilities were built on the Orchid Island, the government did engage gardening experts to make an environmental planning of the island and invited people to visit those facilities to ease their worry about the safety of those nuclear waste on the island.

/12624
CSO: 5100/1

NATION'S FIRST CYCLOTRON LABORATORY DESCRIBED

Budapest FIZIKAI SZEMLE in Hungarian, No 2, 86 p 80

[Article by Adam Kovach]

[Text] As a result of close to ten years of preparation and several years of strenuous work, our domestic arsenal of basic and applied nuclear research obtained a most significant addition. On November 15, 1985 ATOMKI's new acceleration laboratory, and in it Hungary's first cyclotron, was inaugurated.

It has been the consensus among industry experts for some time that it would be of the utmost importance to our domestic research to complement available facilities with the addition of an up-to-date cyclic accelerator, since that would provide opportunities which are qualitatively different and of wider applicability for both basic research and for applications. It became increasingly obvious that a cyclotron in Hungary would not only boost nuclear and atomic (basic) research, but would also signify important advances and would result in improved possibilities in many areas of application, e.g. industrial quality control, medical diagnostics and therapy, botanical improvement, etc. An increasing demand for short half-life positron radiation isotopes also indicated the need for the installation of a cyclotron. This view was further supported by experiences reviewed and information disseminated at the conference held just ten years ago, in August of 1975, in Debrecen, for the investigation of interdisciplinary exploitation possibilities of cyclotrons.

It was obvious from the start that although, at least in theory, our domestic scientific and technological background would have sufficed to build a cyclotron, it would have placed a considerable burden on the majority of our scientific and technological talent, adversely influencing their successes in other fields of endeavor. Under such circumstances, the only reasonable alternative was to purchase a cyclotron, even if it involved considerable financial commitments. In the selection of the type of cyclotron to acquire, we were handicapped from the start by the limited number of types available on the open market, and by insufficient funds at our disposal and thus, practically, the only one we could consider was the 103 cm pole diameter MGC type "compact" cyclotron made by the "D.V. Yefremov" Electro-Physical Institute of Leningrad which, in spite of its small dimensions, has various advantages for intended applications.

After several years of preparation, the Scientific Policy Committee accepted the April 1978 recommendation of the Hungarian Academy of Sciences, the National Technical Development Committee and the National Atomic Energy Committee for the creation of a cyclotron laboratory under the aegis of ATOMKI, and we were able to go ahead with the project, which turned out to be the largest investment under the 6th five-year-plan. Within the scope of its technical assistance program, the International Atomic Energy Commission, too, lent considerable financial support to our nearly 300 million forints worth of capital investment.

Based on the investment program approved in 1979, planning began in 1980 and laboratory construction was started in 1982. Building design was furnished by the East Hungarian Planning Enterprise and general contractors were the State Construction Enterprise of Hajdu County. Both planning and construction represented special tasks for the experts who had to solve a number of problems in creating optimal conditions and, at the same time, meeting radiation protection requirements. For example, construction of extraordinarily thick monolithic concrete walls and floors never before built in Hungary, necessitated the development of special concrete technology.

The cyclotron, which is the central element in the new laboratory is one of the smallest in size in the world, but its advantages (which were proved in practice in the course of jobs performed on similar installations in Finland and the USSR) allow for great versatility in application. We have summarized the cyclotron's major beam data in the table below:

Beam Data of the MGC Cyclotron

Accelerated ion	H^+	$_2H^+$	$_3He^{++}$	$_4He^{++}$
Energy (MeV)				
input beam	2-20	1-10	4-26	2-20
output beam	5-18	3-10	8-24	6-20
Max. intensity (UA)				
input beam	200	300	50	50
output beam	50	50	25	25
Energy dispersion		0.3%		

Major advantages of the MGC cyclotron (beside relatively low max. energy) are a wide range of beam energy variability and high beam intensity, which open up a relatively wide array of application possibilities for our domestic research (not only for the scientists of ATOMKI, but also for all institutions in need of the new laboratory's research facilities. According to the program drawn up during the preparatory stage, about one third of research work planned will involve basic research in the fields of nuclear and atomic physics. A similar proportion will be devoted to industrial and environmental research activities involving nuclear analysis. A considerable proportion of the laboratory program will be aimed at the production of short half-life, positron emission isotopes--mostly for medical purposes--for which, of course, a PET (positron emission tomograph) is indispensable. The target stations, beam conduction system and measuring center of the cyclotron have been designed to

conform to the varying requirements and different needs inherent in the planned multi-purpose application, and so have the cyclotron's collateral laboratory units (radio-chemistry laboratories, separate hospital wing to assure proper patient care in cases of medical treatment administrable on the premises only etc.)

Over and above an evaluation of our possibilities, aims and requirements carried out at several conferences, scientific seminars and meetings (some on an international level), we made sure that we have at our disposal at the outset a concrete scientific program which will allow us to effectively exploit the possibilities afforded by the new laboratory from the start. We felt that most suitable for the purpose, was the project system which, in essence, requires that any scientist who or institution which wants to use the cyclotron, must submit a written proposal of the research they wish to conduct, together with a summary of the anticipated results, specifying any other conditions necessary to accomplish the purpose of the project. The projects will be discussed at the Nuclear Research Institute (ATOMKI) in plenary session and a decision regarding acceptance and scheduling will be rendered by the Cyclotron Committee, especially formed for this purpose. We have devoted particular attention to the so-called initial-stage projects, i.e. planned research projects which, based on available collateral conditions, can be accomplished as soon as the beam is available. Such projects proposed by Nuclear Research Institute scientists as well as by other institutions (Central Research Institute of Physics, Isotope Institute, Lajos Kossuth University of Sciences Experimental Physics Faculty) are ready to get started. We are convinced that their success will fully justify the decision which enabled us to create the cyclotron laboratory.

On the occasion of the laboratory's official opening, in the presence of the President and Secretary General of the Hungarian Academy of Sciences, the representatives of the Permanent Committee for Applied Atomic Energy of the International Atomic Energy Agency and the Soviet Union as well as many invited guests, Lenard Pal, Secretary of the Hungarian Socialist Workers' Party and regular member of the Hungarian Academy of Sciences, inaugurated our country's first cyclotron laboratory.

Aladar Valek, Science Department Head of the Nuclear Research Institute at the Hungarian Academy of Sciences received the Order of Work, golden class, from the Presidential Council of the Hungarian Peoples Republic in recognition of his expert organizational and managerial activities in connection with the completion of our country's first cyclotron laboratory. Five additional persons working for the institute or the construction enterprise received the decoration "For Outstanding Work".

12759
CSO: 5100/3050

BRIEFS

ARGENTINE ENVOY TO BRAZIL ON MUTUAL INSPECTIONS--Argentine Ambassador to Brazil, Hector Alberto Subiza, 57, today said in Sao Paulo that "no agreement has been reached between Brazil and Argentina to facilitate mutual inspections of their development projects in the nuclear energy field." Subiza, who became head of the Argentine Embassy nearly 3 months ago, is serving in Brazil for the third time. He made the following comments: "The way our relations are at the moment, whatever we choose to negotiate we find the doors open. The diplomatic climate between the two countries is quite different, it is improving." The Argentine ambassador does not believe that the recent events which were published in Argentina and Brazil on the nuclear programs of the two countries can affect the good relations between their governments. Subiza referred to the different reactions to the matter among the public in Argentina and Brazil. "Contrary to what happens in Brazil, in Argentina there are no ecological movements opposing the construction of nuclear power plants, nothing of the kind at all." [Excerpt] [Sao Paulo FOLHA DE SAO PAULO in Portuguese 20 Sep 86 p 4] /9604

CSO: 5100/2002

CNEA OFFICIAL CONFIRMS CONSTRUCTION OF NUCLEAR DUMP

Site Selection Requirements

PY290052 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1840 GMT 26 Sep 86

[Text] Buenos Aires, 26 Sep (NA)--Elias Palacios, Radioactive Protection and Nuclear Safety member at the National Commission for Atomic Energy [CNEA], today confirmed that the government has decided to build a storage depository for nuclear waste in the Town of Gastre, in Chubut Province. He also reported that the designs for the nuclear storage depository are already being planned.

The scientist told NOTICIAS ARGENTINAS that this nuclear storage deposit, commonly known as a nuclear dump, will not be used to store atomic waste from other countries.

Palacios said that the storage dump will not have any filtrations that could affect the environment of Gastre, located nearly in the geographical center of Chubut Province.

Palacios said that "Argentina will not have any nuclear waste storage problems until the end of this century." He added that "by the first decade of the next century Argentina will need a nuclear dump to store nuclear waste safely."

He said that "the pre-feasibility study will have to be ready by next year, according to a decision we adopted in 1978 when we planned building the depository."

He said that construction costs will total between $300 and $500 million when finished, and that it will cost the population about 1 or 2 percent kw per hour.

When asked how the site was chosen, he said that "on that occasion we surveyed nearly 200 geological zones feasible for the depository. Out of these, we selected 11, and finally we chose Gastre because it will be cheaper to build there."

Palacios explained that "our main requirement was to find a granite layer capable of guaranteeing safe storage for at least 1,000 years located in an area with no seismic activity and of no mining interest because we must drill

500 meters underground and make sure that the waste that we want to store will be safe."

Concerning the possible threats to the environment in the area of the dump and to the neighboring population, Palacios said that "the safeguards will be the same as in any other nuclear activity." He sarcastically emphasized that "the waste will be protected with glass and lead to the extent that no one will die from radiation when embracing his neighbor."

Asked whether Argentina would receive radioactive waste from other countries, he stated that "there has never been any thought of building a nuclear waste dump for other nuclear powerplants. Our studies take into account the waste of only the two nuclear powerplants we have in the country and the ones that we are planning to build for the duration of their useful life-span."

As for the amount of waste that is produced daily in the country, Palacios explained that "it amounts to approximately one fuel element per day per powerplant." He explained that "there are thousands of burnt out fuel elements, but for the time being we are storing them at the powerplants and they are safe enough for 40 more years."

Speaking about accidents like the one at Chernobyl that could occur, Palacios said that "there is an element of danger in any activity," but explained that "the security of the nuclear industry is substantially greater than that of any other activity."

Palacios also said that "before the end of the year 2000, the decision to start the engineering work to build the reservoir must be made so that we can start using it as soon as possible."

In conclusion, he indicated that "once the reservoir is finished it will be the first of its kind in Latin America because the CNEA is the only organization that is conducting a serious study in this field."

Executive Branch To Decide

PY300101 Buenos Aires TELAM in Spanish 1720 GMT 29 Sep 86

[Text] Buenos Aires, 20 Sep (TELAM)--The National Commission for Atomic Energy [CNEA] today clarified the reports on the possible construction of a nuclear waste dump. It announced that the final decision on the dump will be made by the national executive branch and that pre-feasibility studies in this regard are being carried out. These studies must end in 1987.

The text of the CNEA communique reads as follows:

In reference to reports referring to the construction of a nuclear storage dump for highly radioactive waste, the National Commission reports that the statement the CNEA manager of Radioactive Protection and Nuclear Safety made during a

meeting with a reporter of a news agency (which is not TELAM), was as follows:

1. In 1978, the CNEA decided to conduct pre-feasibility studies for the construction of the dump, with the purpose of detecting technological problems related to the dumping of highly radioactive waste, to identify an acceptable geological formation, and to estimate the cost of the project. This pre-feasibility study must conclude in 1987.

2. The final decision in this regard will be made by the national executive branch, with the advice of the National Commission for Atomic Energy, based on the conclusions of the studies.

/9274
CSO: 5100/2004

CONSTRUCTION OF NUCLEAR SUBMARINES REVEALED

PY300010 Sao Paulo FOLHA DE SAO PAULO in Portuguese 28 Sep 86 p 19

[By correspondent Flavio Tavares from Buenos Aires)

[Excerpts] The first Argentine nuclear submarine will be ready to sail within 2 years, Admiral Ramon Arosa, the Navy joint chief of staff, has openly revealed, thus taking the lid of secrecy off a topic that has been considered taboo in recent years in Argentina.

Only budgetary problems can delay the construction. "If budgetary restrictions do not force us to go more slowly, the country will have its first atomic submarine in 2 years," Admiral Rosa said at the Rio Santiago Naval School (80 km south of Buenos Aires) during a meeting with journalists at the end of a ceremony in which he said good-bye to officers retiring from active duty in the Navy.

The naval war industry calls for the construction of four nuclear submarines. Arosa said: "The plans are still valid and have not been changed. The goal is to build four nuclear submarines, and two of them are in an advanced stage."

In addition to the nuclear submarine project, a project to build two missile-carrying frigates is under way. Admiral Arosa expalined that "the project is not proceeding as rapidly as we would like, because we have to make accommodations for the shortage of resources. Their construction will be slower, and we have to have patience, but the project will be completed." Admiral Arosa's post is equivalent to that of the navy minister in Brazil.

He did not reveal where the nuclear submarine project is being developed. However, everything seems to indicated that it is being carried out at two shipyards. One of them is Avellaneda, in the very metropolitan area of Buenos Aires, less than 5 km from the Casa Rosada, the Argentine Government House. A project based on FRG technology has been in development there for at least 7 years.

In another shipyard, near the city of La Plata, 70 km south of Buenos Aires, near the seacoast, the Navy is coordinating work on the construction of a nuclear reactor, based on designs completed by the National Commission for Atomic Energy [CNEA] in 1982.

At that time, CNEA President Admiral Jose Castro Madero publicly revealed that the construction of a nuclear submarine "was under study." Since the end of the Malvinas war (June 1982), however, nothing else has been heard about this study.

Slightly more than a month ago, nuclear engineer Jorge Cosentino during an interview he gave to FOLHA gave a clue in the story on the Argentine nuclear submarine. He told FOLHA that "some years ago" a navy captain completed the "viability" and "feasibility" study for the construction of a nuclear submarine. The captain was a member of a team that during the military regime occupied two stories of a building owned by the CNEA at 3619 Arribenos Street, in Buenos Aires, a few blocks from the CNEA headquarters. Although he is not an expert in military affairs, engineer Cosentino explained in that interview that perhaps the Argentine route to acquire a nuclear submarine was to transform a conventional unit, like the United States did in 1952. The first U.S. nuclear submarine, the Nautillus, resulted from the transformation of several conventional submarines and the replacement of the diesel engine with a compact nuclear reactor.

A few days ago, the most important Argentine nuclear physicist, Mario Mariscotti, gave us another clue regarding the construction of the nuclear submarines. He denied that the CNEA, where he is head of the research section, has tried to develop plans for the construction of a nuclear submarine, but left an alternative open.

Physicist Mariscotti, in his office at the CNEA building, expressly told us: "There is nothing at the CNEA on that. I do not know anything about it. Perhaps there might be something at the Defense Ministry."

He told the truth. The plan for the construction of nuclear submarines was taken out of the hands of the CNEA (which has had a monopoly over nuclear activities in Argentina) and moved to the Defense Ministry and placed under the direct coordination and supervision of the Navy. Apparently, the same naval experts who during the dictatorial military governments worked on the "Technical viability" project at the CNEA are now heading the submarine construction project. [passage omitted]

/9274
CSO: 5100/2004

RESEARCH ON ALTERNATE URANIUM ENRICHMENT METHOD

PY181647 Rio de Janeiro O GLOBO in Portuguese 15 Sep 86 p 16

[Article by Ramona Ordonez]

[Text] This year's expenditures of 300,000 cruzados do not even equal the proceeds from tickets to a soccer game, but, if the results are positive, they will ensure for the country the expertise to enrich uranium, the fuel for nuclear electricity-generating plants. Since 1980, the Nuclear Engineering Institute (IEN) of the National Nuclear Energy Commission (CNEN), headquartered on Fundao Island in Rio de Janeiro, has been conducting research on the enrichment of uranium through a chemical method which the scientists called Green-yellow Method for the two colors that uranium takes on in its liquid form. Uranium enrichment know-how has strategic value for any country that wants to be independent in the area of nuclear energy. If Brazil lacked this know-how it would be as though it had not developed the technology to produce and refine crude oil.

The research to enrich uranium by the chemical process now being developed at the IEN is part of the so-called Parallel Nuclear Program, which is being conducted by the CNEN in cooperation with the Nuclear Energy Research Institute (IPEN) of the Sao Paulo University (USP) and the Brazilian Armed Forces. The nuclear-propelled submarine that is being developed by the Navy is the project that has progressed fastest under the Parallel Nuclear Program.

The IEN is also conducting important research on electronic instruments for the Critical Unit (nuclear research reactor or zero power reactor) of the IPEN where the material for the nuclear submarine project will be tested. This year, the IEN will invest 20 million cruzados, and its director, Alcir Mauricio, believes that the government decision to encourage research in the nuclear area plus the decision to slow down the pace of expenditures in the Nuclear Program being executed by NUCLEBRAS, will henceforth make more resources available to the IEN. Alcir Mauricio said that he is more concerned about the lack of human resources, which are in shortage because of the low salaries and unpromising future of nuclear energy in the country.

The chemical process of uranium enrichment is in the laboratory stage and, if resources are available, the IEN intends to start the construction of a pre-pilot plant next year. According to the Chief of the Enrichment Division of IEN, Joao Soares Rodrigues, the chemical method is simpler and less expensive than the jet nozzle method being developed by NUCLEBRAS. In the chemical method, the ore does not have to be converted into uranium hexafuoride, a very poisonous gas.

Joao Soares Rodrigues explained that the chemical method is also being developed in Japan, where more progress has been made, to the point that pilot plant for demonstration of the process will go in operation this year. In addition to being simpler, and thus more convenient for a developing country like Brazil, the chemical enrichment process cannot produce plutonium for the manufacture of atomic bombs, because this method can only enrich uranium by 3 percent, not by the 90 percent necessary for weapons. The Chief of the Enrichment Division of IEN believes that in 4 or 5 years, Brazil [will] have the first pilot plant for enriching uranium through the chemical process in operation.

The Instruments and Controls Laboratory of IEN is one of the largest of this type in Latin America, according to its head, Hilton Andrade de Mello. And among other things, this laboratory is developing nuclear medicine instruments, which at present are being imported. A tyrod scanning instrument is being developed and tested.

Another important project being developed at this laboratory is related to electronic instruments to be used in the Critical Unit (nuclear research reactor or zero power reactor) of IPEN, in Sao Paulo, to test the materials that will be used in the nuclear submarine project. The know-how developed by this laboratory is transferred to the national industry.

Research for developing the technology of 'fast-breeders', which are known worldwide as the reactors of the future, because they produce more fuel than they can consume, is being conducted by the Reactor Department. Several European countries are jointly developing that high-cost technology and France has built a reactor called Phoenix (the bird that rises from ashes). According to Reactor Department chief Luis Aghina, the research work is behind schedule due to the lack of funds. The IEN has imported from Italy a complex system of sodium circuits for testing materials for the breeders. However, the sodium circuits were stocked abroad for 1 year and have been stocked for more than 1 year at an IEN warehouse. They cost $10.5 million (145,3 million cruzados) and $1.5 million (20,7 million cruzados) will be required to install them. Their installation is complicated.

The IEN was established conducted by a group of CNEN engineers at the Argonne National Laboratory in the United States. The Argonaut, the first zero-power reactor for training and tests completely built in Brazil was completed as early as 1965. Its equipment and operational instruments were all built in Brazil and developed by the IEN. The Reactor Department chief explained that were it not for the fact that the research virtually stopped for a long period, Brazil would now certainly be much closer to the capability of building a completely Brazilian-made nuclear power plant without having to negotiate technological packages abroad.

/9604

INDUSTRIAL ADVANCEMENT UNDER NUCLEAR PROGRAM NOTED

PY231346 Rio de Janeiro O GLOBO in Portuguese 22 Sep 86 p 15

[Text] Sao Jose dos Campos, Sao Paulo -- The Parallel Nuclear Program initiated in 1980 -- with the objective of learning the whole nuclear energy cycle and independent of the cooperation agreements signed with the FRG -- is yielding positive results including significant advances in the areas of metallurgy, engineering, the manufacture of scientific equipment for nuclear research and medical use, progress in atomic reaction research, and the participation of industry in several areas of the program.

Part of the research work is being conducted at the Advanced Studies Institute (IEAV), which is subordinate to the Airspace Technical Center of the Aeronautics Ministry in Sao Jose dos Campos. One of the IEAV basic lines of research is the study of fast breeder reactors using thorium as fuel, and the enrichment of uranium through the use of laser rays.

According to military sources, the IEAV is expected to give Brazil the capability to master the technology of the entire nuclear fuel cycle by the next decade, thus ensuring the country's autonomy in this area. According to the IEAV plans, expertise in this technology will make it possible for Brazil to have, early in the next century, its own fast breeder nuclear reactors which are almost inexhaustible in their capacity to produce energy.

According to assessments that have been made, Brazil's thorium reserves should be sufficient to supply the country for 1,300 years, while uranium reserves to supply the Angra dos Reis nuclear plants have a potential of slightly more than 100 years.

Brazil has the second largest known thorium reserves in the world -- 1.27 million tons -- and its utilization in the fast breeder reactors will be more economical since these reactors generate plutonium, which refuels the reactor. To master this process, CTA experts have opted for a process that enriches uranium by exciting its atoms using laser rays.

The laser uranium enrichment method was presented for the first time in 1979 by researcher Sergio Porto from the Brazilian Physics Research Center (SBF). The CTA and the IEAV have established an informal cooperation program to exchange information and experience in the nuclear area with Argentine experts. This informal program has been going on for at least 4 years. This research work has produced results which have already been transferred to the national industry and to the medical field.

/9274
CSO: 5100/2003

BRIEFS

SARNEY ON NUCLEAR RESEARCH--Assessing his visit to the United States in a press interview yesterday, President Jose Sarney, 56, said that Brazil will face more commercial conflicts with developed countries. The reason for the conflicts lies in the fact that Brazil's economic growth prompts it to move into "new spaces," into "disputed areas," thus affecting the interests of other countries. Consequently, Sarney said that "it is possible" that he will make trips to Europe and Japan to explain the Brazilian positions. President Sarney finally guaranteed that Brazil is not interested in building an atomic bomb. He explained that nuclear research is directed at peaceful uses. To show that Brazil is a "peaceful" country, Sarney mentioned the Brazilian proposal for the total demilitarization of the South Atlantic--not even permitting the transport of weapons through that region. [Excerpts] [By Gilberto Dimenstein] [Sao Paulo FOLHA DE SAO PAULO in Portuguese 14 Sep 86 p 5 PY] /9274

NAVY FACTORY NEAR SOROCABA--The Navy Ministry is summoning mayors and councilmen of the Sorocaba region, in the state of Sao Paulo, to explain to them about the factory being built by the Navy in the (Iero) municipality, 25 km from Sorocaba. It had been said that it will be used to build atomic reactors for submarines, but Navy Ministry sources have officiall assured that only components will be manufactured in the factory. [Text] [Sao Paulo Radio Bandeirantes Network in Portuguese 1600 GMT 23 Sep 86] /9604

CSO: 5100/2002

ACCUSATIONS OF HEAVY WATER IMPORT DENIED

FOREIGN AFFAIRS Article Reported

Bombay THE TIMES OF INDIA in English 30 Aug 86 p 9

[Article by J.N. Parimoo]

[Text]

WASHINGTON, August 29.

INDIA is secretly building its nuclear weapon-making capability, according to a study done by an American nuclear energy expert.

The expert, Mr. Gary Milholin, in an article in the "Foreign Policy" magazine, has drawn the conclusion that India may have secretly imported heavy water from China or it may have illegally diverted heavy water from its safeguarded reactors.

According to Mr. Milholin, the Reagan administration has already taken up the matter with India and China and it has informed the Soviet Union. Mr. Milholin told a press conference this morning that the U.S. intelligence community was full of rumours that China had secretly exported heavy water to India. He also said the international agency for atomic energy had reported to the U.S. about the diversion of Indian heavy water from safeguarded reactors.

Mr. Milholin says a close study of India's inventories reveals a large gap between the supply and demand of heavy water and the gap suggests that India may be using its secretly acquired heavy water to run its three new reactors which are not subject to international inspection. The new reactors could produce 15 bombs per year, says Mr. Milholin.

CHARGE REPUDIATED

Mr. Milholin called upon the Reagan administration not to sell supercomputers to India and to have no nuclear trade with India till it accounted for the shortage of heavy water in its inventories. He said both China and India had repudiated the suggestion that there had been any secret shipment of heavy water.

India had refused to give any figures for its heavy water production on the ground that such figures were confidential. In answer to a question, Mr. Milholin did admit that India was not the only country to plead confidentiality in refusing to give the figures of heavywater production. He said Canada, another non-nuclear-weapon state like India, had also refused to publish its heavy water production figures. He also admitted that even the U.S. did not publish heavy water production figures.

According to the Milholin article "India's conduct has grave implications for the spread of nuclear weapons" and if the U.S. and the Soviet Union take action India's progarmme can be pulled back.

UNSAFEGUARDED REACTORS

At a press conference yesterday, Mr. Milholin said his study of India's latest available production figures showed that India was 290 tonnes short of the heavy water that it needed to run its three new reactors, all of which were going to be unsafeguarded and, therefore, not subject to any international inspection. He said the question, therefore, was where India got heavy water for the reactors.

There were only two possibilities — either India had secretly imported

heavy water or it had clandestinely dodged the inspection mechanism of the International Atomic Energy Agency and diverted heavy water from safeguarded reactors to use it at the new unsafeguarded reactors.

The three unsafeguarded reactors would give to India, according to Mr. Milbolin, its first chance to build a nuclear arsenal. Until recently India, according to Mr. Milbolin, had only small quantities of plutonium but now that position had changed.

'DISHONEST' PROJECT

Mr. Milbolin said that to him India did not seem to run its nuclear programme "honestly." He thought the new phase in India's nuclear programme would put tremendous pressure on Pakistan and eventually fuel a nuclear arms race in south Asia. He said if in the new situation Pakistan were to test or to assemble a nuclear weapon the U.S. would cut all its aid to Pakistan and that would cripple U.S. efforts to combat the Soviet occupation of Afghanistan.

Mr. Milbolin was told his theory that China had exported heavy water to India did not seem credible because China would not like to help its regional rival to build a nuclear arsenal when it knew such an arsenal would militate against the defence interests of its close ally, Pakistan.

He parried that China was so short of foreign exchange that it could have ignored its long-term interests to make short-term gains. He said China did not treat India as a nuclear rival because India was far behind China in this matter.

Mr. Milbolin said he did not go to India to make the study but admitted he had access to U.S. intelligence sources. Asked if he had consulted the state department, he said the state department was aware of his study. He said he would advise the U.S. administration to put pressure on India to push back its programme.

Bombay (PTI): Top officials of the Department of Atomic Energy (DAE) today categorically denied the U.S. charges.

The sources pointed out that because of some technical reasons the country was importing "some quantity" of heavy water from the Soviet Union, "but this is being done under an open agreement following the safeguards of the IAEA."

Denial From India

Madras THE HINDU in English 30 Aug 86 p 1

[Text]

BOMBAY Aug 29

Top officials of the Department of Atomic Energy (DAE) today categorically denied charges that India was obtaining the heavy water to run its three latest reactors either by importing it secretly or by diverting from other reactors.

The allegations were made in a Washington-based report quoting an article in the forthcoming issue of the *Foreign Policy* magazine which suggested China as the potential source of secret import.

"Our heavy water production capacity is sufficient to meet the demands of all the reactors in the country including the Dhruva Research Reactor at BARC in Bombay," highly-placed DAE sources told PTI.

The sources pointed out that because of some technical reasons the country was importing "some quantity" of heavy water from the Soviet Union "but this is being done under an open agreement following the safeguards of the International Atomic Energy Agency (IAEA)."

The IAEA representatives would be physically present to ensure that the safeguards are observed, they said.

The sources also ridiculed the suggestion that China could be the source of secret import of heavy water and said: "India would be probably the last country to receive heavy water from China."

PRC Denial Reported

Calcutta THE TELEGRAPH in English 4 Sep 86 p 1

[Text]

Beijing, (PTI): China has dismissed as "highly groundless" a report in the US *Foreign Policy Magazine* that it might secretly be selling heavy water to India to help run its three newest nuclear reactors.

Both China and India have previously denied allegations of secret transactions in heavy water.

Meanwhile, a top Chinese nuclear scientist has said Beijing is making headway in its research on the recycling and reprocessing of nuclear fuel, a project vital to the safety of nuclear power stations as it would ensure safer disposal of spent nuclear fuel.

/13046
CSO: 5150/0012

NUCLEAR POWER BOARD CHAIRMAN ON HEAVY WATER AVAILABILITY

Bombay THE TIMES OF INDIA in English 31 Aug 86 p 7

[Text]

BOMBAY, August 30.

THE Rajasthan Atomic Power Station (RAPS) — unit II is the only nuclear reactor in the country which uses non-indigenous heavy water, imported from the Soviet Union under international safeguards, senior officials of the department of atomic energy (DAE) said here today.

Under bilateral agreement with the Soviet Union, heavy water is being supplied to RAPS - II, which was subjected to inspection by experts from the International Atomic Energy Agency (IAEA), Dr. M. R. Srinivasan, chairman of the Nuclear Power Board (NPB), told this paper.

Refuting reports that the DAE was in the process of acquiring a nuclear-weapons capability, diverting heavy water from its safeguarded reactors, and also importing heavy water from China, Dr. Srinivasan described them as "not true."

He noted that the start-up of the Madras Atomic Power Station (MAPS) - I had been delayed by one year due to the non-availability of heavy water. It was during this period (1980-81) that the DAE embarked upon setting up a series of heavy water upgradation plants at Rajasthan and Madras, he said.

These upgrading facilities, which employ either the electrolytic or the distillation processes, were needed to restore the 99.9 per cent nuclear-grade purity of heavy water and for re-use at nuclear plants. However, only downgraded heavy water from unsafeguarded nuclear plants were used for this purpose, he stressed.

Heavy water plants had been set up at Baroda, Tuticorin, Kota, Talcher and new ones were coming up at Thal-Vaishet near Bombay, and Manuguru, he said.

There was nothing unusual in the DAE not giving out its heavy water production figures, he said, and added that even in the U.S. and Canada these figures were confidential.

Mr. Gary Milholin, an American nuclear energy expert, had alleged that India was clandestinely importing heavy water from China to offset a large gap between the supply and demand of heavy water in the country. He also alleged that the DAE was diverting heavy water from safeguarded nuclear plants.

In this context, Dr. Srinivasan pointed out that the heavy water used in the safeguarded installations were fully accounted for to the IAEA. The IAEA had not expressed any misgivings on them.

Parts of the study conducted by Mr. Milholin had been reported in the U.S. media a few months ago. The study appears to have been solely on India's nuclear programme and more specifically with regard to the production and use of heavy water in this country, highly-placed sources said.

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CSO: 5150/0014

PAPER INTERVIEWS NUCLEAR POWER BOARD CHAIRMAN

Calcutta THE TELEGRAPH in English 31 Aug 86 p 9

[THE TELEGRAPH interview with Dr M.R. Srinivasan, chairman, Nuclear Power Board; date and place not given]

[Text]

Dr M.R. Srinivasan, chairman, Nuclear Power Board, is one of the country's seniormost nuclear engineers. From playing a minor role in the construction of Apsara, India's first research reactor, to holding the pivotal post of chief construction engineer of the Kalpakkam power plant, Dr Srinivasan has been intimately involved in almost every phase and aspect of nuclear power generation in India.

In 1974, Dr Srinivasan was made the director of the power projects engineering division of the Department of Atomic Energy (DAE) and given the responsibility of design, construction, commissioning and operation of all atomic power stations in the country. As the emphasis shifted to producing more and more nuclear power, the body was reconstituted as the Nuclear Power Board and Dr Srinivasan was appointed its first chairman in 1984.

Q: Dr Srinivasan, as chairman of the Nuclear Power Board, how would you assess India's performance in the field of nuclear power generation to date?

A: If you look at the programme from the point of view of technological capability, then we have succeeded in establishing comprehensive capability in the entire gamut leading to nuclear power generation. For instance, in activities like mining of uranium, extraction of uranium ore, production of nuclear fuel, capability for designing and building an atomic power plant.

The power that we actually generate from the atom at the moment is of the order of three per cent. The world average is about 15 per cent. So from the standpoint of contribution to electricity production in the country, it is somewhat modest. But we are poised for a fairly important role and, by the end of the century, we hope to reach a target of 10,000 MW, which would then be something like 10 or maybe 15 per cent of the electricity generated in the country.

So one can say that what we have done so far is in the nature of developing a comprehensive capability and prototype activity. The challenge of the next decade and a half is to industrialise this infrastructure to make it into a commercial activity.

Q: How does nuclear power generation in India rank in terms of output and cost effectiveness?

A: The cost effectiveness has been established. We are supplying power from nuclear stations at a cheaper rate than coal-based stations in the Bombay, Madras and Rajasthan regions. So the economics are not in doubt. Our challenge is to increase the nuclear power generation rapidly from about three per cent to 10 or 15 per cent. And perhaps more in times to come.

Q: But there is a feeling in some quarters that since we embarked on nuclear power generation, the programme has been dogged by trouble.

A: This is purely a subjective feeling. One has to understand that this is a new technology that the world as a whole has been learning and that we have had to establish self-reliance in a very advanced area of technology. It goes without saying that one does encounter problems. Problem solving is the very basis of creation of self-confidence. I can only say that when any new technology which is still in its infancy is adopted, one has to be prepared to face these problems.

The important thing is how well we have been able to cope with these problems, and here I think we have done well.

Q: And what would you say are our major successes in the field?

A: Well, when we set out to make nuclear fuel in the early stages—only four or five countries had the capability then—a lot of people did not think we could do it. At one point many people did not believe we

could even make zirconium, which was considered a difficult task. Much later in 1983, it was the designing, building and commissioning of the Kalpakkam power station which was a completely indigenous effort, which impressed many countries. India is the only developing country that can claim such an achievement—the other countries that have done this include the United States, the Soviet Union, Britain, Canada, Germany, Swedes and Japan. Even China, with its well-known nuclear weapons programme, has not, even to this day, designed a nuclear power plant on its own.

Earlier too, with the building of the plutonium plant in the Sixties, India became one of the very few countries which entered the field of separating spent fuel and plutonium. Similarly in the field of heavy water production—we are the only country that has the expertise and experience in three processes of making heavy water.

Q: I suppose these successes have to be looked at against the background of some of the failures, especially the number of breakdowns.

A: You see, any interruption in the operation of a reactor, the newspapers seem to report as breakdown. It is rather like when you put on the television set and it does not show a picture, you call it a breakdown. In the case of the nuclear industry every such malfunction is documented, it is then analysed, the causes established and corrective action taken. We call them unusual occurrences. And there is a regular systematic review of these unusual occurrences.

If I have to give an example—a fuse may blow up. In ordinary circumstances, one just replaces the fuse. In the case of a nuclear plant we establish what the consequences of the fuse failure are and if the consequences are such that it would either disrupt the operation of the reactor or cause concern for safety, then we take steps to duplicate the fuse so that a single fuse failure does not give rise to a problem of that kind. We also have instrumentation to announce that one of the two fuses has failed.

The point I am trying to make is, what you call a breakdown in the newspapers is an interruption in the operations. If you look at any other type of power stations like say thermal power stations there are many more interruptions. Now as of today, Rapp-2 has been operating continuously for 120 days non-stop. Last year Tarapur operated continuously for six months. The conventional thermal power stations in the country have much shorter continuous runs.

The test really is to see whether we have derived high utility from the installed capacity in the power stations. In our case, with the exception of Rapp-1, the stations have been having very good capacity and availability factors. We do have failures of conventional equipment, for instance in Madras we had some problem in the turbine generator and main transformer. But these are conventional equipment problems and we believe that equipment must be made to higher and higher quality. But that is again a learning process in the country. It takes time for things to improve. But these breakdowns don't constitute any safety hazards to the plants or the people who are working there or to the environment.

Q: But the interruptions, as you put it, have been too frequent. Kalpakkam, for instance, had to be switched off only days after Mrs Gandhi inaugurated it.

A: The Kalpakkam incident has been well documented. We synchronised the unit for the first time just half an hour before Mrs Gandhi arrived. It was not expected that after Mrs Gandhi switched on the reactor, it would work without a break thereafter. The point to note is the capacity factor of the Madras reactor in the very first year, it was over 60 per cent and the availability factor was over 80 per cent. Which is extremely good. So a breakdown which takes place does not invalidate the overall performance.

You should ask the electricity people in Tamil Nadu, they will tell you how happy they are at the functioning of the Madras reactors. Barring, of course, the problems we faced with the vibrations when we had to take the units off for some time and the transformer problem. Just now we have a problem in Madras unit 2 relating to the fuel transporting system which is being attended to. In going in for such modern technology one has to be prepared to learn. After all Madras-2 was only our sixth reactor. Many people compare our nuclear programme with the American or the French programme where they have over a hundred reactors.

Q: At the same time, there is a feeling that while the western countries are moving away from nuclear power generation, we are placing more emphasis on it.

A: These things have to be looked at in perspective. Just the statement that the Americans are not building any more nuclear reactors does not convey the fact that they have a hundred reactors already operating and another 70-80 reactors are due to be commissioned. In the next four-five years they will be having something like 140,000 MW of nuclear power. Now compare that with 40,000 MW of total power in this country.

The French are already supplying 60 to 70 per cent of their total power from nuclear energy. They have about 40 to 50 reactors. They are not adding more reactors because for their population and their requirement of electricity, there is a certain saturation point. We are nowhere near saturation point.

Electricity is desperately needed in this country. Our options are extremely limited. Our coal has got 40 or 50 per cent ash. It is really a piece of rock with some calorific content and it is extremely difficult to burn it. The coal based power people will tell you what a misery it is to burn this coal, the problems they have with the boilers and other equipment and how rapidly they keep wearing off and how difficult it is to keep the plant going. With hydro projects we have problems of rehabilitating people, submersion of forests. So where are the options?

TROUBLES WITH NUCLEAR POWER PROGRAM REVIEWED

Calcutta THE TELEGRAPH in English 31 Aug 86 p 9

[Excerpts]

Among the several targets India has set for itself in its march to the 21st century is generation of 10,000 MW of nuclear power by the year 2000. But a couple of major disasters, along with increasing resistance by environment protection groups against the setting up of atomic power plants threaten to reduce this target to just another statistical projection. Although the high influence-low profile nuclear establishment in the country is trying to play down the extent of the setback, the last few years have seen India's nuclear programme on a downslide, after an excellent start it had in the Sixties and Seventies.

The major setback to the country's nuclear power programme is the virtual shut down of the Rajasthan atomic power plant unit one (Rapp-1).

While it became virtually certain that Rapp-1 would not function again—at least not in the near future—the DAE received another jolt when a fire accident severely damaged vital components at the Talcher heavy water plant in Orissa in April this year. Like Rapp-1, the Talcher plant has also been an albatross round the DAE's neck, its commissioning delayed by 11 years and its output negligible compared to its installed capacity.

To attain the target of producing 10,000 MW of power, Indian nuclear planners envisage building more than 10 nuclear reactors in the next 15 years. The nuclear programme has just stepped into its second accelerated phase now. Only three main plants at Tarapur in Maharashtra, Rajasthan, and Kalpakkam in Madras are generating power so far. The Tarapur atomic power station (Taps), with its two units, completed 16 years of operation in November last year. Between them Taps-1 and Taps-2, have generated more than 30,000 million units of power.

However, both reactors, notably Taps-1, have been bogged by problems. Early this year, Taps-2 had a continuous run of 189 days, bettering its previous best of 133 days in 1984. Last year, Taps-2 had an availability factor of 92 per cent and a capacity factor of 84 per cent, the corresponding figures for Taps-1 was 71 per cent and 62 per cent respectively.

Similarly, the performance of Raps-2 has been encouraging as compared to the ill fated Raps-1. While Raps-1 managed to generate only 260 million units of power before it collapsed, Raps-2 generated 1098 million units during 1985 which was the highest generation level attained by the unit so far. The capacity and availability factor of Raps-2 during 1985 were 57 per cent and 71 per cent respectively.

The Madras atomic power station unit one (Maps-1) also performed poorly last year, generating only 946 million units at 46 per cent capacity and 55 per cent availability. The unit had two major outages during the year, caused by vibration problem in the turbine generator.

While Taps, Raps and Maps are plodding along gamely in the face of design and engineering problems, the DAE has been facing a new kind of resistance in the new plants it has envisaged for the next decade. Awkward questions have sprung about the decision to locate the two units at Narora, Uttar Pradesh, on what is undeniably an earthquake zone. The DAE, however, insists that it is designing the reactors taking into account the seismic factor. DAE engineers point out that Japan has also built reactors in earthquake prone zones, with adequate safeguards in design. However Naps-1 and Naps-2 are certain to be delayed even further due to the hold up in the delivery of steam generators. Although the Naps units, on which work began in 1974, were scheduled to be completed in 1981 and 1982, respectively, it is unlikely the units will be commissioned before 1988.

Work at Kakrapara is, however, progressing satisfactorily despite protests by environmentalists and any delay

in the project scheduled to be completed by 1991 will be marginal, according to the DAE.

The ambitious Kaiga project ran into problems even before work on the plant began. The Kaiga units are located in the North Kanara district of Karnataka which has about 80 per cent of forest cover. For the first time, the DAE was forced to hold a dialogue with the local population to convince them there that there would not be large scale destruction of forests as they had feared. But while the agitation continues unabated, the DAE is going ahead with the Kaiga project which it hopes to complete by 1994.

While the units commissioned so far have been in the 210-235 MW range, to accelerate towards the target of 10,000 MW by 2000 the DAE soon plans to go in for the 500 MW reactors. Conceptual design, preparation of feasibility report, appointment of main consultant for all conventional systems and all plant structures for different inland sites have been completed and the preparation of detailed project reports are in progress. But the DAE has already initiated action for advance procurement of material and components and for placement of orders for indigenous manufacture of long delivery equipment. The first 500 MW reactors are expected to come up in Rajasthan and later at Kaiga.

Once the 235 MW units are put up at Kaiga, the DAE plans to switch over entirely to the 500 MW units. However, even with this transition, India may still find it difficult to meet its power needs in the next century. A quantum leap in meeting these needs is expected from the new generation fast breeder reactors on the lines of the experimental FBTR in Kalpakkam. Conventional nuclear reactors being built in the country are regarded as primitive when it comes to the utilisation of uranium. The uranium reserves in the country can support a 15,000 MW conventional reactor-based programme for about 30 years and with 10,000 MW target fixed for 2000 India may run out of this by about 2050.

Fast breeders can extract 70 times more energy from every unit mass of uranium and are seen as a cornucopia of power in the years to come. Western countries have invested large sums of money to develop fast breeder reactors. India too has not lagged behind, but without the uranium enrichment facility, it has had to tread a different path to come up with a suitable fuel mixture. Indian scientists expect the first of the 500 MW prototype fast breeder reactors to be operational in the first decade of the next century.

But while nuclear scientists are drawing up grand plans for generating more and more power from the atom, increasing doubts are being expressed at other levels about the advisability of opting for nuclear power on a large scale. Opponents of nuclear power point out that across the world countries are shying away from nuclear energy and are investing more on exploiting renewable sources of energy. Even in the case of the fast breeder reactors the US and Japan have deferred their projects. Opinion against nuclear power has been gaining momentum in the face of accidents like the Three Mile Island and Chernobyl.

While the DAE plans to put up 22 reactors by 2000 at an estimated cost of Rs 15,000 crores, opponents of nuclear power point at the several breakdowns and outages Indian nuclear plants have suffered even during their limited operations.

However, there is no escaping the fact that nuclear energy represents the only realistic chance to meet the country's power requirements during the next century. With an installed capacity of only 43,000 MW India is already into a massive power crunch that is only going worse each year. The projected power demand by 2000 is more than 75,000 MW. With limited coal reserves, poor quantity of coal and coal mining becoming more costly and hazardous, the emphasis could be on hydroelectric power. But there has been resistance even to the hydroelectric projects besides the uneven distribution of hydroelectric power potential across the country. In the long run, nuclear power seems the only way out, but whether the nuclear establishment can overcome the crises of the Eighties is the immediate concern.

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CSO: 5150/0015

INDIA'S FIRST NUCLEAR POWER PLANT WRITTEN OFF

Bombay THE TIMES OF INDIA in English 31 Aug 86 p 7

[Text]

JAIPUR, August 30.

INDIA'S first atomic power plant at Kota (RAPP-I) is destined to become a "historical monument".

The 220-MW plant, shut down for almost four years, has been finally written off by the atomic energy department for want of necessary technology and massive funds needed for sealing the cracks in the end-shield of the reactor.

Ironically, the plant can neither be dismantled nor even buried. While technology for dismantling it is not available anywhere in the world, the burial is also fraught with danger, cement being porous. The plant will, therefore, remain "in position" after decommissioning. Dispelling doubts of leakage, experts consider this alternative as the safest.

A Chernobyl-type mishap in this state is ruled out by them on the ground that, unlike the Russian plant, the Kota reactor is properly domed. The plant may, of course, bring devastation on a vast magnitude if it is hit by an earthquake in the next three decades, after which the radio activity of the plant will automatically die down. Heavy water has been drained out of the plant and after taking out the fuel, it will be sealed. Monitoring of radio active emission from "probes" will be necessary.

In a recent communication to the Rajasthan state electricity board, the nuclear power board has said, "In its targets of power generation, it had not indicated any generation for RAPP-I during 1986-87." The communication explains that the atomic energy department had developed and fabricated the closure plugs required for sealing the cracks in the end-shield. These plugs were installed in RAPP-I last month and their effectiveness was found to be satisfactory. Surprisingly, one more crack was discovered during the subsequent tests. This new crack was not revealed in the earlier inspection in1985 using hydro, helium, acoustic emission and ultrasonic techniques, probably due to the incipient state of the crack.

The performance of RAPP (unit I) installed in the early seventies, at a cost of about Rs 100 crores in collaboration with the Canadian government, has been dismal while unit II, having the same technology, has shown a record performance. Notably, the difference between the two is that RAPP-I has complete Canadian collaboration whereas the content of Canadian collaboration in RAPP-II is just 20 per cent, the rest being wholly indigenous.

During the past four years, RAPP-I has been a constant headache to the atomic energy department as well as the state government. It has remained closed for 8,070 hours in 1984-85, 7,579 hours in 1985-86 and 3,672 hours in 1986-87 up to July 31, 1986. Incidentally, after remaining closed from March 1982 to January 1985 the unit started functioning on February 1, 1985 and its 50-day continuous run had revived hopes. But it let down the experts again on May 20, 1985. Earlier, efforts to run it at a reduced capacity of 120 MW had proved futile.

Unit-II, installed in April, 1981, produced 1,150 million units between April 1985 and March 1986. It had an outage of only 2,561 hours in 1984-85, of 2,546 hours in 1985-86 and of 151 hours during April and May this year. The number of trippings was 17 in 1984-85, 12 in 1985-86 and four during April and May this year.

The total closure of RAPP-I will deal a crushing blow to the infrastructure of the state which has been reeling under a power crisis for many years. By the end of the seventh plan, during which two thermal power plants of 20 MW each and a gas-based plant of three MW and micro-hydel schemes of 31 MW are to be installed,

the shortfall will jump to 1,300 MW as against the estimated 1,080 MW.

It is because of the continuous shutdown of unit I that the state government has been pressing the Centre for the allocation of extra power from the unallocated reserve available at Singrauli. But it has so far failed in its efforts.

Rajasthan's other grievance is that it was refused permission for setting up thermal generation units because of the supply of power from the two RAPP plants.

This apart, the state electricity board as a consumer of the RAPP will have to suffer a financial loss of about Rs. 32 crores per annum due to the closure of unit I, as the board was getting power from RAPP at the rate of only 35.49 paise per unit.

Also, the present tariff was worked out by the atomic energy department on the basis of the investment on both the units. Since one unit has been closed, the AED will be far from justified in charging the old rate, remarked an official of the state electricity board.

/13046
CSO: 5150/0013

BARC DEVELOPING THORIUM FUEL FOR NUCLEAR REACTORS

Madras THE HINDU in English 26 Aug 86 p 11

[Text]

NEW DELHI, Aug. 25.

Thorium rods made from Kerala's beach sands are being bombarded by neutrons from a Swiss accelerator at Lausanne in a historic experiment that may show the world a short-cut for producing energy from thorium.

The Bhabha Atomic Research Centre (BARC) scientists, who are carrying out the experiment since 1984, say it will provide them data for a "fusion-fission hybrid reactor", that will take in thorium, put out electricity as well as fuel for additional reactors, but create no hazardous, long-lived nuclear wastes.

Enormous amounts of energy are locked up in the country's 350,000 tonnes of thorium reserves and India's current strategy for harnessing thorium is through a long route, requiring construction of a string of fast breeder reactors (FBRs).

The Indo-Swiss experiment at Lausanne's Ecole Polytechnic will provide an alternative to the controversial FBRs for exploiting India's thorium on a time scale much shorter than envisaged by the late Homi Bhabha, it is said.

'Spallation' process: Between the Swiss accelerator and the Indian thorium is a plate of lead where each incident-neutron is multiplied several-fold by a process called "spallation" resulting in a shower of several trillions of neutrons each second.

(Spallation is a nuclear reaction in which the energy of each incident particle is so high that more than two or three particles are ejected from the target nucleus and both its mass number and atomic number are changed.)

Under such intense irradiation by neutrons, thorium turns into uranium-233 (or U-233) which, according to Dr. M. Srinivasan, Head of BARC's Neutron Physics Division, "is the nuclear fuel of the 21st Century."

Named "Lotus", this experimental facility is the signalling of an era of "fissile-fuel factories" which will convert the relatively useless thorium into a powerful fuel for nuclear reactors.

In a few years from now, the neutron accelerator will give way to a still more powerful neutron source—a thermo-nuclear fusion plant—capable of breeding much larger quantities of U-233 from thorium.

New route to nuclear fuel: According to Dr. Srinivasan, one of the designers of "Lotus", such fusion breeders will become available in 15 years, opening a new route to production of nuclear fuel from fertile thorium.

The ultimate idea, Dr. Srinivasan says, is to combine fusion breeder with conventional fission reactor, as in Rajasthan, into a "fusion-fission hybrid reactor" system.

In this system U-233 will be produced in the fusion-breeder and, this, along with thorium, will be used as fuel in the conventional reactor to produce "net electricity" after meeting the power demands of the in-house fusion plant.

A single fusion plant of 750 MW thermal capacity will produce enough U-233 to fuel 40 Rajasthan-type reactors, operating on thorium U-233 cycle, he said.

At the "Lotus" facility in Lausanne, BARC scientists are collecting data on the rate of U-233 breeding that will help them design powerful fissile-fuel factories in future.

Once the hybrid reactor concept becomes a reality, its impact on India's nuclear programme will be enormous, scientists say.

The hybrid reactors will advance by at least 20 years India's nuclear time-table because U-233 can be bred rightaway once fusion-neutron sources become available, it is said.

No worry about n-waste disposal: More importantly, India need not worry about nuclear waste disposal because BARC has found that the reactors based on TH-U233 cycle produce very little long-lived actinide wastes compared to the reactors using plutonium or uranium.

Speaking at the Sri Ram Institute for Industrial Research here recently, the BARC Direc-

tor, Dr. P. K. Iyengar, visualised the hybrid reactor as one that "takes thorium in, and gives out electrical power, besides U-233, which can be used to build additional reactors".

Once the hybrid concept becomes feasible, he said, India need not build FBRs, which are the cornerstones of the current strategy.

These potential advantages have forced BARC to look seriously into fusion-fission hybrid reactors, Dr. Srinivasan said.

Dr. Iyengar said it would only be "a small further step" to make Rajasthan-type reactors run on TH-U233 cycle. At present, the reactor is burning uranium.

A new technology: The fusion plant for breeding U-233 is, however a new technology, seriously pursued in the U.S., Britain, Japan and the USSR.

Considering the rapid developments in the area of hybrid reactors, India need not place too much emphasis on FBR, as "for the first time, we have a serious alternative to plutonium-fuelled breeders", Dr. Srinivasan said.

If India sticks to FBRs, it will be beyond the year 2040 when it will be able to tap energy from thorium, it is said.

Too long to become viable: The FBR, by definition, is a fast reactor that breeds fuel for starting another FBR. But BARC scientists have now found that it would take at least 30 years for one FBR to produce sufficient fuel for the next FBR, which is too long to make the nuclear programme viable.

In contrast, the 'doubling time' is very much less in a hybrid reactor whose another advantage is that the spent fuel can be dumped, saving the enormous cost of storage and reprocessing.

BARC scientists say India will continue with its current strategy for nuclear power until all aspects of the hybrid reactor are thoroughly studied.—PTI

/13046
CSO: 5150/0010

BHABHA CENTER PLANS TO BUILD ATOM-SMASHERS TOLD

Bombay THE TIMES OF INDIA in English 28 Aug 86 p 7

[Text]

NEW DELHI, August 27 (PTI): The Bhabha Atomic Research Centre (BARC) has a grandiose scheme to build a chain of atom-smashers to probe the interior of the atom using a variety of nuclear particles.

Plans are under way to build a proton synchrotron and high energy electron accelerator at the upcoming nuclear complex in Indore.

The synchrotron will be designed to produce protons at energies of 1000 million volts (MEV) for studying "condensed matter and futuristic energy generation options," according to BARC.

The electron accelerator will prove a source of synchrotron radiation "which will give a boost to research on a variety of areas such as material studies, solid state physics and molecular biology" besides possible industrial applications in making microchips, it is said.

BARC is already installing an imported polletron accelerator at Colaba in Bombay that will speed up heavy ions to an energy of 14 MEV.

The accelerator facilities in Indore will be used as national facilities available for research workers from universities and other institutions.

A BARC spokesman said that the successful compissioning of the variable energy cyclotron (VEC) in Calcutta and the two million volt tandem accelerator in Trombay "have provided the experience for launching the major projects in Indore".

But VEC, built ten years ago at a cost of over Rs. 300 million, is yet to produce particles at the designed energy and current.

The particle beam from the machine is so weak, scientists say, that they cannot get an "analysed beam" which is essential for any fruitful nuclear research.

The machine that was supposed to produce several isotopes for hospitals is yet to produce a single medical isotope.

/13046
CSO: 5150/0011

BRIEFS

DAE CLARIFICATION--In a clarification of the press report that the Department of Atomic Energy (DAE) has turned down a Soviet offer of nuclear reactors to India, the DAE said on Friday that "it has issued no such statement," report PTI. [Text] [New Delhi PATRIOT in English 23 Aug 86 p 3] /13046

POSSIBLE FUELS CONSIDERED--New Delhi, Aug. 19.--The Department of Atomic Energy (DAE) has proposed to fuel the Rajasthan power reactor with plutonium instead of only uranium in a major strategy that will overcome the restrictions imposed by a safeguards agreement with the Soviet Union, reports PTI. The reactors, RAPP-I and RAPP-II, are under the International Atomic Energy Agency (IAEA) safeguards since 1977 and India has been reprocessing their spent fuel at a huge cost to extract plutonium which has been accumulating without being put to any use. As the agreement with the Soviet Union forbids diversion of this plutonium to any other facility without IAEA concurrence, it has been proposed to burn this plutonium in RAPP-II itself along with thorium obtained from Kerala's beach sands. Thorium by itself is not a fissile fuel but, inside the reactor, it gets converted into Uranium-233 which will, along with plutonium, produce power. Apart from finding an outlet for the safeguarded plutonium, the DAE strategy will help conserve the scarce uranium which is currently used to fuel the RAPP reactors. The use of the plutonium within RAPP does not violate the agreement. [Text] [Calcutta THE STATESMAN in English 20 Aug 86 p 11] /13046

CSO: 5150/0017

AMROLLAHI URGES ATOMIC ENERGY FOR PEACEFUL PURPOSES

LD302328 Tehran IRNA in English 1648 GMT 30 Sep 86

[Text] Tehran, Sept 30, IRNA — The Islamic Republic of Iran would like to see developing countries be allowed to use atomic energy for peaceful purposes and for promoting their economic and industrial plans, said head of Iran's atomic energy organization Reza Amrollahi in Vienna Monday.

Speaking in the 30th session of the International Atomic Energy Agency (IAEA), Amrollahi said that Iran is strongly against the manufacture and stockpiling of nuclear weapons because of the danger they pose to mankind.

The Iranian official also said that it was obvious that true independent and non-aligned countries have not been allowed to make any progress in the area of nuclear technology and that their research in the field is very primitive. There is no limit on activities or expansion of nuclear arsenals by the superpowers and other countries which have the technology, Amrollahi said. He expressed hope that this "unjust" situation would not last long.

On the June, 1986 Iraqi raid on the Iranian atomic reactor in Bushehr, Amrollahi said that IAEA has so far not taken any deterrent measures against the attack and that the Baghdad regime has not stopped its violations of international regulations.

Amrollahi said that the IAEA seems to have implicitly encouraged the Iraqi regime to continue its destructive attacks by not taking a decisive stand.

The official also listed some of Iran's proposals on how to secure world peace and make the world free of nuclear weapons.

Representatives from nore than 100 countries are participating in the meeting which opened in Vienna Monday. The meeting will end on Friday.

/9274
CSO: 5100/4702

STEPS TAKEN AGAINST RADIATION LEAKS FROM NUCLEAR PLANTS

Muscat TIMES OF OMAN in English 11 Sep 86 p 2

[Text]

Oman is planning to take measures against possible radiation leaks from nuclear plants abroad.

The Permanent Committee for Environment Protection from Nuclear Radiation held its first meeting on Tuesday at the Ministry of Environment and Water Resources.

The chairman of the committee, Under-Secretary for Environment Major-General Bakheit bin Saud al Shantari, referred to the Chernobyl nuclear accident and spoke on the necessity to take steps including monitoring radiation levels, developing warning systems and prevention of damage to life and the environment.

A technical committee constituted under the permanent Committee is to come up with a national emergency plan, according to an Environment Ministry source.

The Permanent Committee has been formed by Minister of Environment and Water Resources and Deputy Assistant to the Chairman of the Council for Conservation of Environment and Water Resources Sayyid Shahib bin Taimour, under the directives of His Majesty Sultan Qaboos.

Matters discussed by the committee on Tuesday included ways to promote cooperation in environment protection held with Swiss authorities.

This follows the discussions Sayyid Shahib had with scientists and officials of specialised organisations during his May tour of Denmark, Holland and Switzerland.

Holland and Switzerland have agreed to cooperate with Oman in its efforts to protect environment from possible nuclear fallout from abroad.

The technical committee formed will be headed by the Technical Affairs Director-General at the Ministry of Environment and Water Resources, and include officials from the following:

The Air Pollution Department, the Council for Conservation of Environment and Water Resources, Diwan of Royal Court Affairs, Musandam Development Committee, Regional Development Committee, the ROP, the Sultan Qaboos University, the Ministries of Agriculture and Fisheries, Electricity and Water, Communication, Interior and Defence.

The Permanent Committee meeting was attended on Tuesday by Under-Secretaries for Agriculture and Fisheries, Health and Communication, Hassan bin Abdulla al Morrazaa, Dr Salem bin Hamdan al Akhzami and Salem bin Ali bin Nassar al Siyabi, and the Director-General for Technical Affairs at the Ministry of Environment and Water Resources Saud bin Salim al Shantari.

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CSO: 5100/4503

PROVISIONS OF NUCLEAR AGREEMENT WITH PRC OUTLINED

Signed in Beijing

BK251225 Rawalpindi THE PAKISTAN TIMES in English 19 Sep 86 p 3

[By a staff reporter]

[Text] Islamabad, Sept 18 — The Pakistan-China agreement on peaceful use of nuclear energy signed in Beijing this week envisages cooperation in five important areas including design, construction, and operation of nuclear reactors for research and power.

Briefing newsmen about the agreement, a spokesman of the Ministry of Foreign Affairs said that it was the first formal agreement on the subject between the two countries. It specified the areas and forms of cooperation. The agreement was signed by Pakistan Foreign Minister, Sahabzada Yaqub Khan, and Mr Song Jian, Chairman of the State Commission for Science and Technology.

The spokesman said that the agreement also spelt out procedures for application of the safeguards of the International Atomic Energy Agency [IAEA]. There is also a special article in the agreement which lays down that cooperation in the atomic energy field would solely be for peaceful purposes and any equipment and material transferred from one side to the other shall not be used for military purpose. Further, IAEA safeguards would apply to such transfers.

The areas of cooperation between the two countries are:

— Production of radio isotopes and their use in industry;
— Application of radiation technology in agriculture;
— Cooperation in nuclear medicine and radio therapy;
— Exploration and exploitation of nuclear minerals, and;
— Design, construction and operation of nuclear reactors for research and power.

The forms of cooperation are:

— Exchange of scientific and technological information;
— Holding of symposia and seminars, and;
— Training of personnel and supply of material and equipment.

In reply to a question whether China will participate in the Chasnma Nuclear Project, the spokesman said that it was only

an enabling agreement and we have not concluded a deal for the manufacture of reactor, nor was it on the anvil [sentence as published]

Questioned further, the spokesman said that China does not produce nuclear reactors for export.

DAWN Terms Accord 'Major Step Forward'
BK251319 Karachi DAWN in English 19 Sep 86 p 15

[Editorial "Sino-Pakistan Nuclear Accord"]

[Text] The Sino-Pakistan nuclear cooperation accord signed in Beijing on Monday is a development of far-reaching importance in the context of the relations between the two countries. By its very nature, the development, however, is bound to evoke conflicting reactions in international circles. Some will see it as a measure designed to promote bilateral cooperation between two friendly countries. Others, not so sympathetically disposed towards Pakistan, will be quick to decry it for its implications in the nuclear non- proliferation context. But seen against the background of the cordial relations between China and Pakistan, the agreement should be welcomed as a major step forward in bilateral cooperation, especially in the field of technology. Since 1976 when Islamabad and Beijing signed an agreement on cooperation in science and technology, the two sides have concluded seven protocols to promote technical collaboration in various areas, such as oil exploration, oceanography, industrial standards, and aquaculture. In pursuit of the process laid down by these arrangements, it is but logical that the two governments should have now decided to extend the scope of their cooperation to the peaceful use of nuclear power. Pakistan will, no doubt, be the major beneficiary. Although individually some of its nuclear scientists are of world renown, the Chinese have made far more impressive progress in research and development in the atomic field, training of nuclear scientists, and the manufacture of nuclear science systems. They have nine locally produced reactors operating in the country. Over 4,000 nuclear scientists are conducting research in China, and the country is today in a positin to build without any outside help a medium nuclear power station. Having reached the state where it can export nuclear reactors at competitive prices and share its know-how with other friendly countries, China should quite understandably wish to expand the scope of its cooperation with others. In fact, it took a step in this direction in early 1984 when it joined the IAEA. Later, it concluded nuclear cooperation agreements with Brazil, Japan, and the U.S. The accord between Islamabad and Beijing follows the same pattern.

What, however, needs to be noted about the agreement signed on Monday is that it provides fully for safeguards against the non-proliferation of nuclear weapons. The two parties have specifically emphasised that the accord is for peaceful purposes only and, as is standard practice now, they have incorporated in it the safeguards laid down by the IAEA to cover all material and equipment transferred under the agreement. Given the widespread use of nuclear technology for power generation and for other non-military purposes, the peaceful objectives of the Sino-Pakistan agreement should evoke universal approval. But in view of the furor raised last year in the U.S. Congress and by the media in India and the West about the nature of Pakistan's nuclear programme and China's so-called role in it, one cannot rule out similar reactions to the present accord. If this happens, it will not be the first time that Beijing and Islamabad's credentials on this account have been questioned. China's nuclear cooperation agreement with the U.S. which was initialled in April 1984, met with strong congressional opposition on the alleged ground that China was helping Pakistan design a nuclear bomb. Of course, the allegation had been strongly denied. Yet the Western media kept on making insinuations against Pakistan and China. One only hopes that the performance would not be repeated all over again. There is much to establish Pakistan's and China's commitment to the peaceful use of nuclear technology under the agreement. That many of the doubts expressed last year in the context of non-proliferation were unfounded was evident by late 1985 when the U.S. Congress cleared the Sino-American nuclear accord. Moreover, Pakistan's willingness to sign the NPT [Nuclear Nonproliferation Treaty] on a reciprocal basis with India should help confirm its peaceful intentions in nuclear matters.

/9274
CSO: 5100/4700

COMMENTARY DEFENDS NUCLEAR AGREEMENT WITH PRC

BK270714 Karachi Domestic Service in English 1715 GMT 26 Sep 86

[Station commentary]

[Text] The prime minister of Pakistan, in a speech made in Azad Kashmir recently, reiterated that the agreement recently signed between Pakistan and China for cooperation in the nuclear field was exclusively designed for peaceful purposes. He said no other country, especially those in the region, should feel any apprehension in this regard.

The agreement has clearly mentioned that the material supplied by China to Pakistan for the purposes of research and development in nuclear technology would be governed by the safeguards laid down by the International Atomic Agency [name as heard]. An inspection of this shows incontrovertibly that no covert objectives are contemplated. It has been specifically mentioned that the cooperating nations will participate in the realm of development in the region of agriculture, medicine, and power, the areas in which Pakistan has already been conducting research and has already made some positive advances. But to make further progress in this sort of crucial research, it needed some valuable assistance.

Pakistan believes that nuclear technology for military purposes used by the Third World countries is a luxury, which they can ill afford. It has held that to build a nuclear arsenal would not only take much time to be of any use but is likely to promote an armaments race, which could not serve any useful purpose. It has always aligned itself with those countries who want the Indian Ocean region to be nuclear-free zone. The immense capital invested for the purpose can more suitably be utilized for raising the standard of living of the people. This is exactly what Pakistan is aiming at.

It was recently stated that the energy situation in Pakistan is very precarious. With the delays in the setting up of the power houses at the Port Qasim plant and in the completion of the hub [dam] project, there is certainty that Pakistan would be faced with considerable [power] load shedding in the year 1988 to 1992. And with the possible increase in demand, the need for heavier load shedding is likely to continue.

Nuclear power production is necessary to meet our demands. The agreement between Pakistan and China to cooperate is a link in the chain. It is most surprising that a country in the region continues to cry loud against possibilities which do not exist, while it itself has openly developed its military nuclear potential. The charge that Pakistan is making nuclear weapons has been refused [as heard] time and again from responsible quarters. Instead of accepting facts on their face value, they are being represented as a threat, even while the same party is building an arsenal of additional weapons — larger than any country in the whole of Asia. Mutual trust is the only ground on which positive pattern of peace can be built. Such a trust can only emerge out of admitting the reality as spelt out by either side. It is no service to peace to work for the breakdown of mutual respect by constantly hammering on a charge, which has been spelt out as having no legs to stand upon.

China has once again proved itself a real friend to Pakistan by agreeing to help it improve its potential in nuclear research and development for peaceful purposes. Even so for supressing any doubt, it has insisted on a type of safeguards which may be necessary and to which Pakistan has readily consented.

/9274
CSO: 5100/4701

FRANCE EXPECTED TO HONOR ATOMIC PLANT DEAL

Lahore NAWA-I-WAQT in Urdu 29 Jul 86 p 4

[Editorial]

[Text] Changes in itinerary for the final stage of Prime Minister Mohammad Khan Junejo's recent trip abroad made on his arrival in Paris are expected to produce pleasing results. According to the original program, Prime Minister Junejo was to have an official meeting with French Prime Minister Jacques Chirac during his brief stopover in Paris. But the French Government transformed the arrival of the distinguished Pakistani visitor into a full-scale official visit, and so the Pakistani prime minister stayed in Paris for 2 days and a night. During his stay he had an official meeting with Chirac, and French President Mitterand also had a detailed meeting with Prime Minister Junejo. Pakistan has long had one major problem with France, and that is the impasse created in the supply of the atomic reprocessing plant. In this connection, a formal treaty was negotiated between France and Pakistan in March 1976 whereby France was to have supplied the desired plant to meet Pakistan's requirements. It is certain that before signing this treaty the French Government must have satisfied itself in every possible way that Pakistan would be using this plant for peaceful purposes and that it would never use it to join the nuclear weapons race. France had also obtained the necessary clearance from the International Atomic Energy Agency. It is a coincidence that France's current prime minister, Chirac, happened to hold the same post at the time the treaty was signed. But later the United States put pressure on France not to supply the desired plant to Pakistan. Proof of this pressure was revealed in the Tehran papers, then Secretary of State Henry Kissinger also admitted it. The current U.S. ambassador to Pakistan, Deane Hinton, also admitted that the United States put such pressure on France a number of times and that the French Government, yielding to this pressure, stopped the implementation of this treaty 2 years later, in 1978. Today, 10 years after the signing of the treaty, the desired plant still has not been supplied to Pakistan. The Jewish lobby played a big role in punishing Pakistan, and by spreading rumors about an "Islamic bomb" created concern that Pakistan with the help of this plant would start making nuclear weapons, which would be supplied to Libya or other Arab countries, thereby endangering the security of Israel in the Middle East. The Indian lobby was also very active against Pakistan in this campaign. India, which had already successfully exploded an atomic device, was not prepared to give this right to others.

The Indian intransigence was such that it not only refused to sign the nuclear nonproliferation treaty, but at the same time it would allow its nuclear installations to be inspected. In contrast, Pakistan's stand right from the beginning has been that it does not wish to make atomic bombs and that its atomic program is for peaceful purposes only. It is an irony of fate that Pakistan's stand has been rejected, and that all the thieves have gotten together and started crying thief. This is why during Prime Minister Junejo's formal discussions with President Reagan, as usual the host country expressed doubts and misgivings about Pakistan's atomic program, and according to the BBC, President Reagan warned Pakistan that if it were to make a nuclear bomb, all economic and military aid would be stopped. President Reagan also said that it was necessary to avoid a nuclear weapons race in South Asia. Prime Minister Junejo informed President Reagan that neither does Pakistan wish to make nuclear weapons nor does it have the ability to do so. In an interview carried on U.S. television, Prime Minister Junejo also stated in no uncertain terms that Pakistan does not have any intention of making nuclear bombs and that Pakistan's nuclear program is conducted solely for peaceful purposes. He added that Pakistan is facing an energy crisis and that in order to meet its ever increasing energy demand, it is trying hard to produce nuclear energy; in this way he tried to remove U.S. misgivings.

The Junejo-Chirac meeting took place in this atmosphere, and it is certain that the issue of supplying the atomic reprocessing plant was discussed. It is gratifying to note that Chirac has especially friendly feelings toward Pakistan. The treaty on supplying the plant was signed in 1976 during his term of office. He has said openly that France would not in any way try to withdraw from this treaty. Prime Minister Junejo, during a press conference on his return to Pakistan, said that discussions at the foreign minister level would take place between Pakistan and France on the question of the supply and installations of the atomic reprocessing plant. He said the French prime minister affirmed that the matter would be settled amicably, and he added that his talks with the French prime minister and the French president were very meaningful and successful. The fact that Pakistan is facing an energy crisis of great magnitude no longer needs explanation. During the last few years, he said, electrical load-shedding has become an everyday practice; he added that the cost of the difficulties the urban population is experiencing can be estimated, but the irretrievable loss suffered by the agricultural and industrial sectors is intolerable for the economy of a developing country like Pakistan. Because of the impasse in the supply of the reprocessing plant by France, Pakistan even today is lagging 10 years behind, while the rest of the world is at a new crossroads of development. Pakistan needs nuclear technology not only to meet its energy requirements but also for diagnosing diseases in hospitals, for protecting food, for protecting harvests from fatal diseases and germs, and for other scientific and research projects. With the return of Chirac to office it is hoped that, acting realistically, he will not only make the supply of the plant possible without further delay but that he will also provide Pakistan with an atomic reactor. This is the way can the loss suffered by Pakistan since 1976 due to violation of the treaty on the supply of the atomic reprocessing plant be compensated. Pakistan has appealed to the International Court of Justice against this violation, and based on the warnings received so far, it appears that the proceedings

in this case are in Pakistan's favor, which in turn is proof that Pakistan's stand is based on justice. In these circumstances, it is to be hoped that the French Government will take the necessary steps to implement the 1976 treaty in order to meet Pakistan's legitimate requirements and also to provide it with an atomic reactor. It is time for this to be carried out.

BRIEFS

NUCLEAR PLANT SITE SOUGHT--ESCOM [Electrical Supply Commission] head of marketing John Anderson says an investigation into a suitable site for a second nuclear power station is continuing, but a decision in this regard is not expected before 1991. Speaking at a meeting with the Southeastern Areas Development Association, Mr Anderson said 19 possible sites on the Cape's west, south and east coasts are being considered, but the survey would not consider areas east of Port Elizabeth. He said ESCOM's generating capacity was greater than present demands, but demand is expected to increase to such an extent that it will exceed supply by 20 percent in the year 2004. Also, ESCOM will have to expand in view of an expected coal shortage over the next 50 years; it is accepted that a second nuclear power station will have to be built. However, Mr Anderson emphasized that ESCOM is not planning on an operational station before the end of the century. [Text] [Johannesburg Domestic Service in Afrikaans 1400 GMT 25 Sep 86 MB] /9274

CSO: 5100/2

TAIWAN OBTAINS NUCLEAR TECHNOLOGY FROM U.S., MOSCOW CHARGES

OW/182025 Moscow Radio Peace and Progress in Mandarin to China 0300 GMT 18 Aug 86

[Station Observer Ivanov Commentary]

[Text] On 17 August 1982, the United States and China issued a joint communique on the Taiwan issue. Ivanov, an observer of this station, has the following comments on the event:

According to the joint communique, the United States will gradually reduce its arms sale to Taiwan. However, on the very day when the joint communique was made public, U.S. President Reagan pointed out in a speech: U.S. policy on continued arms sales to Taiwan has been unequivocally expounded in the communique, and is completely in conformity with the Taiwan Relations Act. Arms sales to Taiwan will continue in accordance with this Act.

Let me remind our listeners that the Taiwan Relations Act was signed by the U.S. President only 100 days after the United States and the People's Republic of China established diplomatic relations. In fact, the Act has fully preserved the military relations between Washington and Taipei. China has repeatedly expressed its serious opposition to the Act because it actually embodies the idea of two Chinas or one China and one Taiwan. Nevertheless, Washington has ignored all China's protests in this regard.

The United States is continuing to arm the Kuomintang reactionary clique in Taiwan. the United States constantly supplies the Taipei militarists with modern weapons. In addition, it has also given Taiwan the exclusive rights to make guided missiles, modern fighters, and other military equipment. The United States is appropriating funds and dispatching experts to Taiwan to set up military enterprises there, and is helping produce military equipment and weapons.

The foreign press has repeatedly reported that it was from the United States that Taiwan obtained the technology and raw materials to make nuclear weapons. It is reported that Taipei has made, or will soon make, nuclear weapons. It should be pointed out that the U.S.-Taiwan military relations completely conform to the Pentagon's strategic thinking and to Washington's militarist policy in the Asian-Pacific region. Since 1950, U.S. warlords have regarded Taiwan as their unsinkable aircraft carrier near China's coasts.

I would like to refer to the remarks by an advisor to the U.S. State Department at a recent news briefing before American and foreign journalists. He went so far as to say that U.S. military aid to Taipei is conducive to peace and stability in Asia.

Dear listeners, as you know, the U.S. imperialists' preparation for large-scale aggression in the Far East is described by their propaganda machine as a measure to insure security in Asia and counter the Soviet threat. In the eyes of the U.S. administration, U.S. Executive Order No. 59 is also for peace in Asia and in the world as a whole. That order lists more than 100 extremely important facilities in China as targets for U.S. nuclear strikes.

/12913
CSO: 4100/1

VATICAN EXPLAINS SUPPORT OF NUCLEAR ENERGY

AU170855 Rome ANSA in English 0845 GMT 17 Sep 86

[Text] (ANSA) Rome, September 16 — The Vatican came out Tuesday with a pro-nuclear energy stance, qualifying its support for nuclear power plants with the condition that they be limited in number and pose no threat to human life.

The stance was aired by Father Enrico di Rovasenda, the coordinator of the pontificia Academy's nuclear energy panel, in a interview published by Rome's *La Repubblica* daily.

The panel was assigned the task of probing the moral questions underlying nuclear energy and coming up with a "moral" response to the issue.

"I do not believe that you can issue an absolute 'yes' or an absolute 'no' with respect to peaceful nuclear energy", said the Dominican clergyman.

"It is unthinkable to suggest cancelling all the advantages that the great discovery of nuclear energy has brought", he added.

"The employment of nuclear energy for war objectives must be ruled out categorically", he concluded, "but it cannot be unconditionally ruled out with respect to be peaceful purposes".

The interviewer asked Father Di Rovasenda what stand the pontificia Academy may take with respect to the "nuclear issue".

He replied that the Academy will suggest building the fewest nuclear power plants possible, with the highest possible safety standards.

In the West's open societies, consumption may be reduced, he said, "but in the Third World, where there is dire need, nuclear energy could offer a solution to many problems as long as it is not installed as part of a colonization, or profit-marking, design...."

/9274
CSO: 5100/2401

NUCLEAR DECISION IN 1988 EXPECTED

The Hague ANP NEWS BULLETIN in English 19 Sep 86 p 1

[Text] The Hague, 19 Sep--The Netherlands will decide in the spring of 1988 whether to go ahead with plans to build new nuclear power plants in the 1990's, Environment Minister Ed Nijpels said last night.

The government decided last year that new nuclear plants should be built to heop Dutch industry retain its competitive edge against businesses in neighbouring countries which have the advantage of cheap energy.

But the plans were suspended in the wake of the Chernobyl nuclear reactor disaster in April. The government said at the time it would not decide whether to put them into action until the causes of the Soviet accident were clear and had been evaluated.

Nijpels yesterday sent the second chamber of parliament a detailed programme of studies and measures which would be carried out before the final decision was made.

He said it could not be ruled out that the Netherlands would decide to abandon nuclear energy.

All the advantages and drawbacks were open to debate and serious arguments by environmental groups would be considered, he said.

Extensive studies would be held into the safety of nuclear plants, the lessons to be drawn from Chernobyl, and the long-term effects of nuclear accidents.

The minister estimated that damage caused by Chernobyl would cost the Netherlands several tens of millions of guilders. The costs this year would be 13.2 million guilders, and in 1987 some 6.6 million, he said.

/9274
CSO: 5100/2403

LACK OF SAFEGUARDS AT NUCLEAR WASTE DUMP REPORTED

Madrid EL PAIS in Spanish 10 Sep 86 p 16

[Article by R Fraguas: "The CDS Has 'Proof' that French Trucks Frequent the Radioactive Waste Dump"]

[Text] Madrid--Tomas Martin Tamayo, provincial chairman of the Social Democratic Center (CDS) of Badajoz, reported to this daily yesterday that he has eyewitness and graphic proof about the recent and continued presence of heavy French Trucks in the District of Azuaga near the radioactive waste dump of El Cabril, in the Valdeinfierno coal mine and in Mina de la Oscuridad on the border zone between Cordoba and Badajoz. Spokesmen for the National Radioactive Waste Enterprise (ENRESA), owner of the installations, categorically denied these statements.

Martin Tamayo says that early on the morning of 12 June, a member of the CDS riding a trail bike [motorcycle] entered the zone surrounding the El Cabril nuclear waste dump. "The young man," adds the local CDS leader, "saw that large trucks with French license plates traveled along access roads to the installations of the nuclear waste dump." The same observation was repeated by the young motorcyclist the following morning. "Suddenly, his presence was discovered by the guards, who guard the installation equipped with radio transmitters. He was chased by them to the Padajoz town of Azuaga," adds Martin Tamayo.

Suspicions

The eyewitness report by the youth, repeated to the local leadership of his party, have served Tomas Martin Tamayo, provincial chairman of the CDS, in arguing his suspicions on the alleged transfer to El Cabril of radioactive waste coming from France.

Martin Tamayo said that he does not state that the presence of the French trucks necessarily means the transfer of French radioactive wastes there, although he said that "the citizens of the Azuaga district of Padajoz have the right ot receive information on what is happening there." Martin Tamayo also said that he has many reports from residents of the district to confirm his statements.

Sources of the ENRESA company, owner of the installations of El Cabril, categorically deny the statements by Martin Tamayo. "There has never been even the smallest amount of nuclear waste from France, nor trucks with plates from that country, nor anything like that.

"That information is false from beginning to end. They never made a trip of any kind of that nature. Only wastes of low and medium radioactivity of Spanish origins are stored in El Cabril under the supervision of the Nuclear Safety Council and with the knowledge of the Andalucia Board. There are no Civil Guards guarding any installation. The establishment, located in the municipal limits of Hornachuelo, may be visited," said a spokesman of the company in an unsigned note.

Other sources reported that "it is impossible that nuclear wastes from France are returned to Spain, since the only ones that are sent to France for reprocessing are those from the nuclear powerplant of Vandellos I, of which none have been returned to our country up to now."

Low Activity

In any case, they add, because they are highly active wastes, generally irradiated fuel, they would never be sent to El Cabril, which only stores low and medium activity radioactive wastes.

ENRESA sources reported that the El Cabril installations contain some 10,000 drums of radioactive waste material. The nuclear waste dump was inaugurated in 1961, and up until 1985 it belonged to the Nuclear Energy Board. Recently, its highway accesses have been reconditioned, as have the modules for the storage of the sealed drums which contain the waste.

8908
CSO: 5100/2577

DESIGN DEFECTS DISCOVERED IN ASCO POWERPLANTS

Madrid EL PAIS in Spanish 9 Sep 86 p 13

[Article by Lola Lara: "Investigations on Malfunctions in Asco Discover Design Defects in the Two Nuclear Powerplants"]

[Text] Asco--The original design of the two Asco nuclear powerplants show defects, made evident as a result of the investigations initiated for finding the origin of the last malfunctions by Group 2, according to the explanation of Nuclear Safety Council (CSN) Inspector Javier Zarzuela. The director of the powerplant, Ignasi Camps, yesterday confirmed that these supposed design errors are being investigated and that they refer to an error in the calculation of maximum temperatures that the activating mechanism of the main steam check valves can withstand and still function properly.

In a meeting held with the media last Saturday, Javier Zarzuela said that the first investigations made in Asco 2 as a result of the failure of one of the safety systems (the one consisting of the steam check valves) point to the convergence of three factors as being the last causes of the irregularity discovered: dirty oil and excessive pressure in their circuits and overheating of the valve activating mechanism. With respect to this last factor, he said that while the manufacturing company, the U.S. company, Monroe, indicates that this mechanism can operate correctly at a temperature of up to 41 degrees centigrade, subsequent tests determined that during summer months temperatures of over 50 degrees centigrade existed in the powerplant.

According to Ignasi Camps, this would be the design defect to which Zarzuela referred in a meeting with the 13 mayors of the Asco nuclear area. As far as Camps is concerned, the origin of the defect would be the existence of a microclimate in the zone of the siting of the powerplants, which would allow reaching temperatures higher than those estimated initially. This would have led to an error in the establishment of play (spaces left between the meshing of some parts so that they can move properly and which are directly related to the temperatures to which they are going to be subjected) in the mechanism for activating the valves.

The problem, in the opinion of Ignasi Camps, does not require a complicated solution, since it could be solved simply by changing the oil. However, he does not categorically discard the possibility that the CSN will order the replacement of this mechanism, up to now a servomotor made by the American company, Monroe, with another one which could very well come from the same manufacturer.

New Delay

If this error in the calculation of temperatures is verified, the incident would affect group 1, since its design is identical to that of Asco 2. This Group has been shut down since last 4 July for the replacement of one-third of the uranium and its new startup date was scheduled for the second half of this month. However, it cannot be discarded that it will undergo a delay if the CSN confirms the existence of this design defect, because even though it has been said that the technical solution would not be complicated, it would bring with it a series of bureaucratic transactions (import permits, problems of supply...) which could keep both powerplants shut down for more time than initially foreseen.

As for the other irregularities detected in Asco 2, which remains shut down since last 23 August as a result of the failure in the steam valves--those referring to dirty oil and excessive pressure in their circuits--the resident CSN inspector in Asco already said last Saturday that the solution is simple. It would be enough to insert additional filters, which will prevent the contamination of the oil, and to insure correct regulation of the pressure of the oil.

However, the possibility that some human error by workers or technicians of the powerplant existed, specifically in the handling of the oil which may have allowed the entry of dust particles, is being studied by the CSN, which does not discard the imposition of penalties on the user electric companies; penalties which could be the maximum if the existence of human error is confirmed.

Despite the fact that it is a holiday in Madrid, a CSN commission yesterday received the technicians of Asco 2 in morning and afternoon sessions to have a joint discussion of the report prepared by the powerplant, which subsequently should be submitted to the plenary meeting of the agency together with that prepared by the CSN.

Elsewhere, the green Greenpeace bus arrived in Tarragona yesterday. In a press conference, its spokesman in Spain, Jordi Bigas, criticized the permit that the CSN granted Asco 2 for going into operation after a failure in the steam check valves was discovered for the first time last 1 July, a failure that was repeated last 23 August.

8908
CSO: 5100/2577

NUCLEAR ENERGY SAFETY ISSUE REVIVED FOLLOWING CHERNOBYL

Stockholm DAGENS NYHETER in Swedish 31 Aug 86 p 12

[Article by Ake Ekdahl]

[Text] It is a deeply divided Energy Council that will present a report this fall on which the government and Energy Minister Birgitta Dahl must base their decision on nuclear power. Special interests and old political ties are determining the conclusions that are being drawn with regard to the future of nuclear power after Chernobyl.

Once again, the parties in parliament must find some alternative by the end of this year that can gain the support of a majority as well as provide the highest possible level of safety. The positions are the same as before: the Center Party and VPK (Left Party Communists) want a more precise formulation of the government's strategy to phase out nuclear power. The Social Democrats and the Liberal Party want to phase out nuclear power as rapidly as possible, without endangering important environmental goals and employment levels. In both cases, there is great interest in examining safety conditions at the Barseback plant. The Conservatives want to continue using nuclear power throughout the lifetime of the nuclear plants.

So far, the government's strategy has been to decide which alternative sources of energy should be prioritized when nuclear power is discussed during the party congress of 1990 and to develop a plan by 1995 for phasing out nuclear power. The Chernobyl incident does not appear to have changed this schedule.

The Energy Council will meet on Tuesday without having come any closer to accomplishing its task of evaluating the consequences of Chernobyl for Sweden and the consequences of phasing out nuclear power in Sweden more quickly. The council is waiting and hoping for a miracle from its group of experts. This group will meet once again on 6 October and by 4-5 November the council is to have reached a decision. After that time, the government will meet with the opposition parties in parliament to discuss energy policy.

Gigantic Network

Behind the Energy Council and its group of experts, who must now make the scientific assessments, there is a gigantic nuclear power establishment. It

spans the entire society. There are political coalitions, municipalities, cooperatives, organizations, authorities, businesses, researchers--all representing substantial economic interests, both public and private.

The nuclear power establishment in Sweden can be compared to a gigantic molecule with numerous bonds in many directions. Key figures such as Carl-Erik Nyqvist, director general of the State Power Board, belong to a number of different boards, study groups, and management organizations. For example, who did not get to know Gunnar Bengtsson of SSI (National Institute of Radiation Protection) last summer--the man with the pleasant accent? What is SSI? The answer to this question and explanations of several other abbreviations used in the nuclear power debate are presented below.

Political Organs

The political organs are at the top of the hierarchy. This includes the municipalities and local zoning boards, but also environmental organizations and a large number of study groups, more or less permanent, that examine energy issues. Perhaps the International Atomic Energy Agency (IAEA) in Vienna, under the Swede Hans Blix, should also be mentioned here.

Parliament: Energy policy guidelines were established by a parliamentary resolution in the spring of 1985. The main reference points for the phasing out of nuclear power are 1990, when parliament must come up with a plan for alternative energy sources, and 1995, when parliament must have a plan and legislation for eliminating nuclear power. In parliament, the Social Democrats and the Liberal Party support the decision to phase out nuclear power by the year 2010. The Center Party and the Communists want to proceed more rapidly. The Conservatives do not want to be tied to any particular date.

The government: The cabinet member who is responsible for nuclear power is Energy Minister Birgitta Dahl. She is a minister without portfolio under Industry Minister Thage G. Peterson.

The Energy Council: It was appointed by the government as a consulting group for the upcoming elimination of nuclear power. All the parties in parliament are represented. The council also includes representatives from business, the power industry, researchers, organized labor, the municipalities, and environmental movements. Energy Minister Birgitta Dahl is the chairman. After the accident at Chernobyl, the council was given the additional task of studying its consequences on Swedish nuclear power. A special group of experts was appointed, under the leadership of county governor Gote Svensson.

Monitoring

Nowhere else in the world is nuclear power safety so extensive and well organized as it is in Sweden. An extensive monitoring apparatus makes sure the regulations are followed. From time to time, these organizations have changed names and assignments. In addition to the county government, the Environmental Protection Board, and the Franchise Board for Environmental Protection, special mention may be made of the following.

SSI: The National Institute of Radiation Protection is the supervisory authority for protection against dangerous radiation. SSI establishes maximum permissible values for radiation doses. SSI is a part of the Agriculture Ministry. The government appoints the board. There are representatives from organized labor, public interest groups, occupational safety organizations, environmentalists, and the Social Welfare Board. The SSI chief is Gunnar Bengtsson.

SKI: The Nuclear Power Inspection Board is the supervisory authority that monitors operation of nuclear power generation to see that the regulations are followed. It is part of the Energy Ministry. The board is appointed by the government. The SKI chief is Olof Hormander.

SKN: The State Nuclear Fuel Board monitors the handling of spent nuclear fuel by the power companies and it is the responsible authority for the phasing out of nuclear power. It is responsible for supplying information to the general public on waste and on the elimination of nuclear power. The board is under the leadership of Gerhard Ronnkvist. The board is appointed by the government.

The Energy Authority: Since 1983 it has been the central administrative authority for the energy supply. It is charged with working for the effective use of energy and dealing with safety questions. It is under the leadership of Hans Rode.

SRV: The State Rescue Service was established on 1 July of this year. It is the main authority in charge of rescue work in the event of a nuclear accident. Its main tasks are providing information and training. Its leader is Lennart Myhlback.

Research Needed

Reactor safety, waste treatment, and solutions to the problem of long-term storage of radioactive waste in the future require significant resources for research.

SKB: Svensk karnbranslehantering AB is owned by the State Power Board and the other three nuclear power companies. It is the task of SKB to develop, plan, construct, and operate facilities for spent nuclear fuel from the 12 Swedish nuclear power plants. It also deals with the uranium supply. A facility for the intermediate storage of spent nuclear fuel (30-40 years) has been constructed in Oskarshar ab). There is a special vessel, the Sigyn, for the transport of sper . SFR is a final storage facility for low and medium level radioact waste from the nuclear power plants. It is a repository under 50 meters of rock beneath the seabed near Aland. It will be complete by 1988.

RKS: The Nuclear Power Safety Board is an organization formed by the nuclear power producers to gather information on Swedish accidents at nuclear power facilities. It does extensive work on the international level.

Studsvik: The company has 1,100 employees and sells systems and services in the energy field. It is envolved in high-technology research and production. In Studsvik, south of Stockholm, there are major nuclear technology resources, including a reactor for fuel samples. Studsvik has a special training center for nuclear power personnel, AB Karnkraftsutbildning (AKU). Extensive research is underway on storage in rock at the old Stripa Mine at a depth of 360 meters.

SGAB: Sveriges Geologiska AB is a state-owned company, under the authority of the Industry Ministry, which has taken over consulting work previously done by the old SGU, Swedish Geological Surveys. SGU prospected for uranium, while SGAB is prospecting for solid rock to serve as a final storage facility for nuclear waste.

Several Owners

All this monitoring and research revolves around four power producers, the owners of the various nuclear power plants with a total of 12 units. The state, which is the ultimate monitoring agent for this activity, is also the predominant owner. The municipalities are also important part-owners. Private ownership interests are most important at Oskarshamn and Barseback. The power producers have a joint organization called Kraftsam.

The State Power Board: This is a state-run business with 11,000 employees. It is the largest power company and provides almost half the country's electricity. Half the electric power is generated by nuclear plants. The State Power Board is the sole owner of the four reactors at Ringhals and has a strong interest in Forsmark.

Sydkraft: This is Sweden's largest power producer after the state-owned State Power Board. It generates electricity primarily from nuclear power, but also from hydroelectric power, coal, and oil. Sydkraft is the sole owner of the two nuclear power plants in Barseback and owns 46 percent of the plant at Oskarshamn. Sydkraft is owned by municipal and private interests.

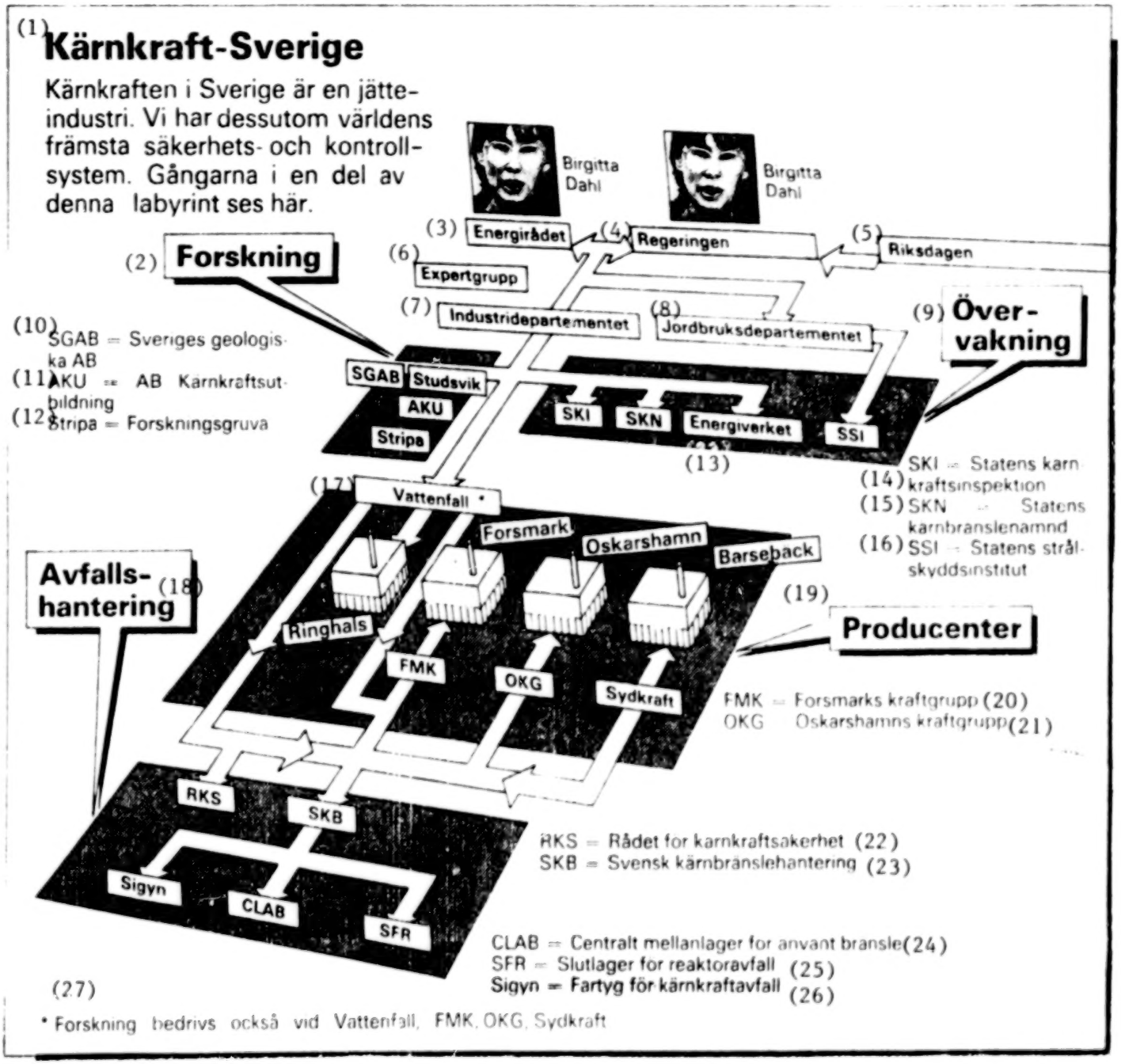
OKG (Oskarshamns Kraftgrupp): This company has constructed and is operating three nuclear power plants in Oskarshamn. Eight municipal and private power companies are part-owners. The municipal ownership is predominant, in that Sydkraft, Stockholmenergi, and Gullspangs Kraft own 62 percent. Other owners are AB Skandinaviska Elverg, Stora Kraft, Varmlandskraft, Krangede, and Balforsens Kraft AB.

FMK: Forsmarks Kraftgrupp, with municipal (Stockholm) and private interests, owns 75 percent of the three nuclear power plants. The State Power Board and Mellansvensk Kraftgrupp own the rest.

Private Interests

In recent years, the participation of private interests in nuclear power production has been reduced by political decisions. Some private participation continues in the form of maintenance and operation of nuclear power plants. This includes Asea-Atom, a semistate-owned manufacturer of nuclear power plants and fuel. Asea-Atom is now the only company outside the United States and the Soviet Union that can deliver complete nuclear plants.

Other companies listed on the stock exchange are state-owned Uddcomb, which has manufactured reactor vessels and steam generators, the Wallenberg-owned Asea Stal AB which manufactures turbines, Sandvik Steel which is a Skanska company, Avesta AB of the Johnson Concern, ABV which is one of the largest construction companies in Europe, what remains of Nohab Verkstads AB, and finally AB Kollin & Strom, which is involved in maintenance at all Swedish nuclear power plants.



Key to figure:

1. Nuclear Power in Sweden: Nuclear power in Sweden is an enormous industry. In addition, we have the most outstanding safety and monitoring system in the world. Part of this labyrinth is shown in the figure.
2. Research
3. Energy Council
4. Government
5. Parliament
6. Group of Experts
7. Industry Ministry
8. Agriculture Ministry
9. Monitoring
10. SGAB: Sveriges geologiska AB
11. AKU: AB Karnkraftsutbildning
12. Stripa: Research Mine
13. Energy Authority
14. SKI: Nuclear Power Inspection Board
15. SKN: State Nuclear Fuel Board
16. SSI: National Institute of Radiation Protection
17. State Power Board
18. Waste Treatment
19. Producers
20. FMK: Forsmarks Kraftgrupp
21. OKG: Oskarshamns Kraftgrupp
22. RKS: Nuclear Power Safety Board
23. SKB: Svensk Karnbranslehantering AB
24. CLAB: Central Intermediate Storage for Spent Fuel
25. SFR: Final Storage for Reactor Waste
26. Sigyn: Ship for transport of nuclear waste
27. *Research is also conducted at the State Power Board, FMK, OKG, and Sydkraft

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BRIEFS

NUCLEAR FUEL TO FRG--Asea-Atom has landed a large German order for nuclear fuel. This order amounts to about 200 million kronor. The company will deliver 350 fuel assemblies, so-called Svea-fuel, to the Brunsbuttel Nuclear Power Plant west of Hamburg. The nuclear power plant is operated by Hamburgische Elektrizitats Werke AG. [Text] [Stockholm DAGENS NYHETER in Swedish 30 Aug 86 p 14] 9336

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